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### Promoting eyewitness testimony quality: Warning vs. reinforced self-affirmation as methods of reduction of the misinformation effect

**Abstract:** *In a typical experiment on the misinformation effect, subjects first watch some event, afterwards read a description of it which in the experimental group includes some incorrect details, and answer questions relating to the original event. Typically, subjects in the misled experimental group report more false details than those from the control group. The main purpose of the presented study was to compare two methods of reducing the misinformation effect, namely – warning against misinformation and reinforced self-affirmation. The reinforced self-affirmation consists of two elements: the participants recall their greatest achievements of life, and are being given a positive feedback about their performance in a memory task. The obtained results showed that the reinforced self-affirmation was more effective than warning, although the latter also caused a significant reduction of the vulnerability to misinformation.*

**Key words:** *misinformation effect, warning, reinforced self-affirmation, eyewitness testimony, reducing misinformation effect*

#### Introduction

##### *Misinformation effect*

The misinformation effect consists in the decrement in eyewitness report accuracy arising after exposure to misinformation concerning the original event. Technically, it refers to including by a witness into his/her testimony details inconsistent with the original event, originating from sources other than the event itself (Polczyk, under revision). This phenomenon has been widely explored since early seventies (seminal work: Loftus, Miller & Burns, 1978; Pezdek, 1977).

The typical experimental procedure used to explore the misinformation effect consists of three phases. In the first phase, participants typically watch a video clip or a sequence of slides, which is called “original material”. Next, they are exposed to the postevent material which, in the experimental group, contains some misleading information. For example, in the original material the robber had a gun, but it was said in the postevent material that he had a knife. Afterwards, subjects are asked to answer questions about original material, including questions referring to the misled details. Numerous experiments using various modifica-

tions of this basic paradigm confirmed and replicated the finding that the accuracy of misled subjects as regards the misleading questions is much lower compared to non-misled ones (for a review, see: Loftus, 2005; Polczyk, 2007; Wright & Loftus, 1998).

The misinformation effect is being intensively researched, mainly because of its obvious relevance for the applied forensic psychology. It may also be relevant e.g. for political psychology, advertising or marketing (compare: Braun, Ellis & Loftus, 2002; Loftus & Banaji, 1989).

The main areas of the research on the misinformation effect deal with analyzing the mechanisms of the misinformation effect (e.g. Bekerian & Bowers, 1983; Blank, 1998; McCloskey & Zaragoza, 1985) and its determinants (for a review see: Polczyk, 2007). Another important area concerns the methods or procedures by which the misinformation effect might be reduced. Such research is extremely important as the vulnerability to misinformation is a phenomenon of obvious importance for the applied forensic psychology. However, the literature on such methods is scarce. As reducing the misinformation effect is the main topic of the present article, we provide a review of existent ideas or methods how to reduce the misinformation effect.

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### *Reducing misinformation effect*

*Warning against misinformation.* This is the most straightforward idea for inoculating against misinformation in the context of eyewitness memory and misinformation effect, still researched nowadays, studied experimentally from the very beginning of the research on the misinformation effect. It consists in warning subjects against possible discrepancies between the original and postevent materials.

The first experiment on warning of this kind was presented by Greene, Flynn and Loftus (1982). They pointed to four possible reasons, why warning may reduce vulnerability to misinformation. First, if warning is presented before the original event, it may make the participants memorize the content of the original material better, making it therefore more resistant to misinformation. Second, if the warning was issued after presenting the original event, it might have made the subjects to rehearse its content, therefore improving the memory of it and increasing resistance against misinformation. Third, warning may cause a more thorough processing of the postevent material. Finally, warning may result in a more careful answering the questions included in final test.

To verify these options, Greene et al. (1982, Experiment 1) conducted an experiment in which the moment of warning was manipulated: before the original material, between the original and postevent materials; after the postevent material and before the final test, or not at all. Greene et al. (1982) found that the resistance to misinformation was the greatest in the group who received the warning before reading the postevent text. Finally, Greene et al. concluded that the effectiveness of warning consists in deep and thoughtful processing the postevent material.

Further research into the warning as a method of reducing the misinformation effect produced mixed results, from a total elimination of yielding to misinformation (Lindsay & Johnson, 1989), to the complete lack of its efficacy (Neuschatz, Payne, Lampinen & Toglia, 2001; Zaragoza & Lane, 1994). Some light on this issue may be shed by the results of an experiment conducted by Polczyk (2007), who found that warning was effective in the case of a very distinct and vivid original detail, but not in the case of an item which was difficult to notice in the original material. This result suggests that an important prerequisite for the warning to be effective is the ability to detect discrepancies between the original and postevent materials. If the original detail is very difficult to detect, for example because it is quite peripheral, warned subjects simply do not know what is the misinformation. If, on the other hand, the original detail is easy to spot, it is also easy to detect discrepancies. In such a situation, warning against discrepancies directly informs the subjects what is the wrong answer.

Some paradoxical effects of warning subjects should be mentioned here, namely, the tainted truth effect (Echterhoff, Groll & Hirst, 2007). It consists in *poorer* memory

functioning among persons who were not misled, yet they were warned against nonexistent inconsistencies between the original and postevent materials.

*Cognitive interview.* In its current form (Fisher & Geiselman, 1992), the cognitive interview includes several techniques aiming at establishing a good rapport between the interviewee and the interviewer and enhancing good communication. It also includes four memory techniques: mental reinstating of the context of the event, reporting everything, recounting events in the reverse chronological order, and adopting different perspectives while recalling events, e.g. as if the eyewitness "saw" the event from a different place. In a number of research, the cognitive interview proved to enhance the quality of testimony substantially (a review: Memon, Meissner & Fraser, 2010).

Some studies indicated that the cognitive interview may be promising as a method of reducing the vulnerability to misinformation, although not all empirical findings confirmed it.

For example, Holliday and Albon (2004) found that the cognitive interview reduced susceptibility to misinformation in children. Holliday, Humphries, Milne, Memon, Houlder, Lyons and Bull (in press) reported that it was effective in reducing the misinformation effect among elderly people. However, its efficacy proved to be poor among adults (Centofanti & Reece, 2006).

*Arousal.* In just one research it turned out that arousal induced after presenting misinformation may inoculate against it (English & Nielson, 2010). In this research, after the original material and the misinformation, the participants watched a film clip, which in one group was arousing (a live-action oral surgery), in the other was neutral. English and Nielson (2010) found that when tested for the memory of the original event one week later, the participants who watched the arousing clip yielded to significantly fewer misinformation items than the group who did not watch the arousing clip.

*Reinforced self-affirmation.* In 2012, Szpitalak designed a method for reducing the vulnerability to misinformation, which she called reinforced self-affirmation (RSA). It is based on a situational improvement of a person's self-esteem, accomplished by a combination of self-affirmation and positive feedback. Self-affirmation consists in making the participants write down all their greatest life achievements, whereas positive feedback results from a manipulated memory task (see detailed description in the *Procedure* below).

The main premise for developing such a procedure was the assumption that an enhancement of the self-esteem, even temporary, causes an enhancement of self-confidence. In other words, it was expected that thinking about one's achievements activates positive self-image, which is con-

firmed by getting positive feedback from an “objective” source (from the experimenter) results in greater self-confidence. The greater self-confidence should in turn lead to a greater resistance to influence. It should be so because enhanced self-confidence should be connected with lesser need for relying on external opinions, cues and suggestions when making any decisions. A self-confident person should be prone to use his/her own judgment and therefore be less likely to yield to outer influence, including influence in the form of the misinformation about formerly seen events. This assumption is already somewhat supported by existing data, for example, Saunders (2012) found that low self-esteem (as measured by Rosenberg’s Self-Esteem Scale (1965) is connected with higher yielding to misinformation.

The RSA proved very effective in reducing the misinformation effect. In sum, until now its efficacy was replicated in seven experiments (Szpitalak, 2012; Szpitalak & Polczyk, in press; Szpitalak & Polczyk, under revision). Moreover, it proved effective also outside the context of the memory misinformation effect, namely, in making persons more resistant to the door-in-the-face technique (Szpitalak, Polczyk & Cyganiewicz, under revision). The door-in-the-face technique consists in first making a large request, difficult to accomplish. If a person rejects the large request (which he/she usually does), he/she becomes more prone to accomplish a smaller request compared to a situation in which the smaller request was not preceded by the large one (Cialdini, Vincent, Lewis, Catalan, Wheeler & Darby, 1975). In the experiment by Szpitalak et al. (under revision) the RSA reduced the efficacy of this technique to the level of a group in which the smaller request was not preceded by a large one.

It is worth noting that none of the both elements of the RSA, that is, the self-affirmation and the positive feedback seems to be effective when applied separately: people who did a self-affirmation but were not given a positive feedback were not more resistant to misinformation than those who did not a self-affirmation (Szpitalak, 2012). Similarly, the positive feedback without self-affirmation did not produce any reduction of the misinformation effect (Szpitalak, 2012). Thus, it seems that only the combination of “internal” and “external” sources really enhances self-esteem: the self-affirmation done by the participant him/herself and positive feedback obtained from somebody else gives a cumulative effect needed for a real effect.

### Hypotheses

In the presented experiment we wanted to compare two methods of reducing the misinformation effect – warning and reinforced self-affirmation. First of all, we wanted to replicate the misinformation effect. Thus, in the first hypothesis we assumed that the mean number of answers consistent with misinformation would be higher in the misled group, compared to the control one. Secondly, we expected

that warning against discrepancies between original and postevent materials would cause increased resistance to misinformation. In other words, the mean number of answers consistent with misinformation should be lower in the warned misled group than in the non-warned misled group.

Thirdly, we assumed that the efficacy of the RSA would be replicated – the mean number of answers consistent with misinformation ought to be lower in the group in which RSA was administered, compared to the misled group without RSA. It is important to note that in the planned research the RSA was placed *after* exposing the postevent material. In the majority of experiments performed so far (e.g. Szpitalak, 2012; Szpitalak & Polczyk, 2012), it took place before the postevent material. It is however important to verify whether it is effective when placed after the misinformation. Otherwise it would be difficult to make any use from it in real life situations. In practice, any technique directed at immunizing against misinformation may only be administered after the witness has already been exposed to possible false information, for example in the mass media, TV, or other witnesses.

We could find no premises as to what method of reducing the misinformation effect should be more effective – the warning or the reinforced self-affirmation. Thus, the comparison of these two methods was an exploratory part of the analysis.

## Method

### Participants

Two hundred and nine (127 female, 82 male) students (except psychology students) took part in the experiment. Mean age was 19.17 ( $SD = 1.75$ ). No gratification for the participation was given. The participants were recruited mainly from the university database and participated for credit points.

### Materials

1. The original material: an audio recording (male voice) of a duration of 1 min 57 sec, presenting the fictitious “planned reform”, consisting in introducing a final exam at the end of the education. The speaker, introduced as one of the creators of the reform, elaborated on various advantages of introducing such an exam; thus, the speech was informative but also persuasive
2. The postevent material: a description of the original material, which in the experimental group contained six misleading details.
3. The memory test – a set of 10 open-ended questions, including six critical ones.
4. A list of 60 nouns from various categories to remember, e.g. forest, horse, needle, kitchen, pen

5. Fillers (unrelated questionnaires), not connected with the aim of the study, used to fill in time intervals between the parts of the procedure

### Procedure

The experimental design used in the study was  $2 \times 3$  (misinformation: present / absent; manipulation: warning / RSA / none). The experiment was run in groups from 4 to 11 participants. The experimenter introduced herself as a scientist from the Jagiellonian University, performing research for the National Council for Higher Education, concerning a “planned reform of Polish universities”. Similar procedure was used earlier by Apsler and Sears (1968) and Petty, Cacioppo and Goldman (1981). The experimenter explained the purpose of the planned reform and afterwards the participants listened to a recording about it. In order to make the procedure more plausible, the subjects were asked to give written opinions about the reform. After 15 minutes, participants read a description of the recording which for half of them included six misleading items. For example, the Jagiellonian University mentioned in the original material was replaced in the postevent material with the University of Bialystok. Then, in the group with the RSA, the first phase of this procedure was performed: the participants were asked to write down the greatest achievements of their lives (as many as they wanted). The subjects were given the following rationale for the filler questionnaires, as well as for the procedure of reinforced self-affirmation: “We would like to research the determinants of the attitude toward the planned reform” Afterwards, they were asked to memorize as many words from a list of 60 words as they were able to. After two minutes they had to write down all words they could recall and were given positive feedback about their performance, namely, they were told that an average number of remembered words among persons of the same age is 9.3. This number was false – in order to give positive feedback, it was about 1.5 *SD* lower than real average number noted in the pilot study. This constituted the second part of the RSA procedure.

In the same time, the participants from the control and the warning groups were to make a written description of the way from their house to the lab. They were also asked to memorize as many words from a list of 60 words as they were able to, but were not given any feedback. After 10 minutes, the participants were given the final memory test, presented as the “last task to be completed” which in the warning group was preceded by a written warning against possible discrepancies between the original and postevent materials.

To sum up, there were three groups of participants (both in the misled and non-misled groups): with RSA, with warning, and without any manipulation directed to reduce the susceptibility to misinformation.

### Results

The open-ended answers in the final test were recoded as: “1” - answer consistent with misinformation; “0” - all other answers or lack of answer. The answers “1” were summed up across all six critical questions, giving a numeric estimate of the susceptibility to misinformation ranging from 0 to 6. In Table 1 descriptive statistics for the mean number of answers consistent with misinformation are presented.

Table 1. The mean number of answers consistent with misinformation

Factor or interaction	Levels of factors		N	Answers consistent to misinformation		
	Method	M		Mean	SD	95% CI
Method	none		67	1.43	1.85	0.99 - 1.88
Method	warning		76	1.26	1.56	0.91 - 1.62
Method	RSA		66	1.03	1.44	0.68 - 1.38
M		non-misled	97	0.20	0.42	0.11 - 0.28
M		misled	112	2.15	1.72	1.83 - 2.47
Method × M	none	non-misled	36	0.06	0.23	-0.02 - 0.13
Method × M	none	misled	31	3.03	1.56	2.46 - 3.60
Method × M	warning	non-misled	35	0.26	0.44	0.10 - 0.41
Method × M	warning	misled	41	2.12	1.66	1.60 - 2.65
Method × M	RSA	non-misled	26	0.31	0.55	0.09 - 0.53
Method × M	RSA	misled	40	1.50	1.63	0.98 - 2.02

Legend:

Method: method of reducing the susceptibility to misinformation

M – misinformation

RSA – reinforced self-affirmation

The first hypothesis was verified by computing the main effect of the influence of misinformation on the number of answers consistent with misinformation. The hypothesis was confirmed, as the difference between the misled and control group was significant and quite remarkable in its magnitude ( $F_{[1,203]} = 138.01$ ;  $p < 0.001$ ;  $\eta^2_p = 0.40$ ). Then, the interaction between misinformation and manipulation was analyzed; it was statistically significant ( $F_{[2,203]} = 8.86$ ;  $p < 0.001$ ;  $\eta^2_p = 0.08$ ; see: Figure 1).

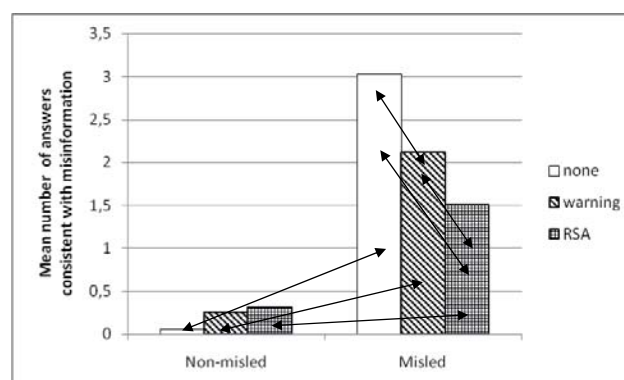


Figure 1. Mean number of answers consistent with misinformation as a function of presence vs. absence of misinformation and the methods of reducing the misinformation effect (significant differences are marked with arrows).



The results of planned comparisons comparing all combinations of levels of factors are presented in Tables 2 and 3. As can be seen in Table 2, misled subjects performed worse from control ones regardless of the method of reducing the misinformation effect. Of greater importance however are the comparisons done in the misled group among various combinations of methods of reducing the misinformation effect, presented in Table 3 and visualized on Figure 1.

To start with, misled warned persons were more resistant to misinformation than those from the control group, which confirms the hypothesis two (see Table 3). The third hypothesis was also confirmed – participants engaged in the reinforced self-affirmation procedure were less susceptible to misinformation than participants from the control group. Finally, RSA proved more effective in reducing the misinformation effect than did the warning (Table 3).

Table 2. Comparisons between misled and non-misled groups in the mean number of answers consistent to misinformation across all combinations of methods of reducing the misinformation effect

Method	<i>F</i>	<i>df</i>	<i>p</i>	$\eta^2_p$
none	98.73	1,203	< 0.001	0.49
warning	43.92	1,203	< 0.001	0.22
RSA	14.98	1,203	< 0.001	0.07

Table 3. Differences between groups in the mean number of answers consistent to misinformation

Misinformation	Comparisons of methods		<i>F</i>	<i>df</i>	<i>p</i>	$\eta^2_p$
Non-misled	none	warning	0.48	1,203	0.488	< 0.01
	none	RSA	0.64	1,203	0.424	< 0.01
	warning	RSA	0.03	1,203	0.873	< 0.01
Misled	none	warning	9.79	1,203	0.002	0.05
	none	RSA	27.43	1,203	< 0.001	0.14
	warning	RSA	5.24	1,203	0.023	0.03

Legend:

M – misinformation

RSA – reinforced self-affirmation

## Discussion

As was expected, misled persons were more vulnerable to misinformation than non-misled ones. This confirmed the first hypotheses and replicated the well-known misinformation effect. This is but another warning how vulnerable the memory can be to distortions, at least in some circumstances.

The second hypothesis was also confirmed: warning was efficient in reducing the misinformation effect. This result is consistent with outcomes of many other studies (e.g. Blank, 1998; Chambers & Zaragoza, 2001; Echterhoff, Hirst & Hussy, 2005; Ecker, Lewandowsky & Tang, 2010; Greene et al., 1982; Wright, 1993). It is also worth

noticing that there are also results suggesting that warning might be ineffective (e.g. Neuschatz et al., 2001; Zaragoza & Lane, 1994). As mentioned in the Introduction, according to Polczyk (2007), warning can only be effective if a person is aware of the discrepancies between original material and misinformation. Unfortunately, the three-step procedure used in the presented experiment does not allow for replicating this finding.

An important finding of the present study is the replication of the effectiveness of the reinforced self-affirmation procedure in reducing the misinformation effect, applied after the postevent material. As was mentioned in the Introduction, the RSA proved successful in reducing the misinformation effect many times (Szpitalak, 2012; Szpitalak & Polczyk, in press), but in most of the research it was applied before the postevent material. This somewhat limits the practical usefulness of the RSA as a method of immunizing eyewitnesses against misinformation, because in reality any influence can be exerted on a witness after he/she had already been exposed to possible misinformation. When a witness is being interviewed at a police station, he/she might have already been exposed to any amount of information about the event he/she is telling about. Because of that, if the RSA were only efficient when applied before the postevent material, its practical value would be doubtful. Fortunately, this is not the case: in the research presented in this article, RSA reduced the vulnerability to misinformation when applied after it. This is a replication of the results obtained by Szpitalak (2012).

Introducing the RSA after the postevent material comes with the cost of difficulties with comparing the results with those stemming from research in which RSA was placed between the original and postevent materials. Such comparisons cannot be made with the present results and require further research.

Reinforced self-affirmation was more efficient in reducing the vulnerability to misinformation than warning the participants against possible discrepancies between the original event and the description of it. Trying to explain this fact, we may start with analyzing the very mechanism by which a warning works. As described in the Introduction, the efficacy of a warning was attributed to, for example, deeper and more thoughtful processing of the postevent material (Greene et al., 1982). As a result, more discrepancies might have been discovered by a participants, allowing him/her to choose the correct answer. This however is only effective if the subject is quite sure what was presented in the original material, and what was mentioned in the postevent text. When the participant feels that different information was presented in the original and postevent materials, but is not confident about his/her memory, the final answer may still be wrong. The greater efficiency of RSA may be based on the processing of items about which the participants are not confident whether their own memory is correct. In the warning condition, the subjects are alerted

to the possibility of discrepancies, but are not particularly motivated to process them, nor are they encouraged to trust their own memories. In contrast, if RSA indeed, as hypothesized, enhances self-confidence, then the processing of “dubious” cases may be different: when a participant is not absolutely sure about what he/she has seen, but in reality his/her remembrance is correct, the elevated self-confidence may help to rely on his/her own memory, therefore promoting correct answers.

One question which remains open is the problem of time intervals between the three parts of the procedure. They were rather short, in order to fit the procedure into the standard duration of classes in the school (45min). Whether the efficacy of RSA would preserve when the time intervals were, say, days or weeks, is unknown at present and needs further research. Also, the generalizability of the results obtained over other populations, for example people at different age than students needs further research.

Another interesting question arises, if and to what extent are the effects of RSA generalizable, that is, whether it may be immune against other kinds of influence, or just against mnemonic misinformation effect only. In its current form the RSA relies heavily on memory phenomena - the positive feedback refers to the quality of memory. It is therefore possible that the effects of RSA may limit to memory phenomena only. On the other hand, as mentioned in the Introduction, there is one experiment in which RSA proved successful in immunizing against quite other form of influence, namely the “door-in-the-face” technique (Szpitalak et al., under revision). This result of course needs replication, but seems promising. It may suggest that although the RSA itself is based on memory, the resulting enhancement of self-confidence may be effective behind the context of influencing memory reports. However, at present no direct conclusions concerning the generalizability of the RSA in areas other than the misinformation effect are possible. This problem needs further research.

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